REMARKS

Applicant appreciates the indication of allowing claims 5, 12, 15, 21, and 23 if amended into independent form. However, Applicant has provided the following remarks and arguments to demonstrate distinctions between the claimed invention and the cited prior art references.

Status of the Claims

Claims 2-30 are currently pending in the present application. Claim 1 was previously canceled. Claims 4, 7, and 28 have been amended to correct antecedent basis issues and typographical errors to clarify the invention herein. No new matter has been added.

Objection of Claims

On page 2 of the Office Action mailed November 1, 2005, the Patent Office objected to claims 4, 7, 26, and 28 for various informalities. Applicant has amended claims 4, 7, and 28 in response to the Patent Office's request. Applicant offers the following remarks with regard to claims 26 and 28 in light of the Patent Office's objections to the claimed subject matter.

On page 3 of the Office Action mailed November 1, 2005, the Patent Office requested a "more appropriate term so as to clarify the functionality of the loop filter" in claim 26. Applicant provides the following comments to demonstrate the properties of the exemplary infinite impulse response (IIR) filter claimed and discussed in paragraph 17 of the originally filed specification. One of ordinary skill in the art would recognize that the properties of an IIR filter allow it to theoretically "store" an output impulse related to a given input impulse for a theoretical infinite amount of time due to the feedback of the filter. In reality, each input impulse of the IIR filter will have a related output impulse that is substantially the same value, but decreases in value over a given period of time, which is determined by the time constant of the IIR filter. Therefore, when subsequent input impulses are introduced to an IIR filter before previous output impulses have substantially decreased to zero, the IIR filter will have retained the values that were previously input into the IIR filter in addition to the subsequently introduced input impulses. Thus, a loop filter, such as an IIR filter, can be "...configured to store a plurality of values of the phase...," as stated in claim 26.

On page 3 of the Office Action mailed November 1, 2005, the Patent Office suggested the phrase "the channel estimates" in claim 28 should be changed to "a channel estimates" since

the phrase was not previously introduced. Applicant has made amendments to claim 28 so that it now states "a plurality of channel estimates" in order to correct this typographical error.

Applicant has also amended the language describing the "channel transfer function estimate" to "a plurality of channel estimates" because the channel estimates used for equalization and those computed by the channel estimator are the same. (Applicant's Specification at ¶ 37 and 41). Therefore, no new matter has been added and the claim language is made consistent with the originally filed Specification.

Rejection Under 35 U.S.C. § 103(a) – Peeters, Kumagai, and Magee

On page 4 of the Office Action mailed November 1, 2005, the Patent Office rejected claims 2, 3, and 6 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,628,738 to Peeters et al. (hereinafter "Peeters") in view of European Patent No. 1,172,956 to Kumagai et al. (hereinafter "Kumagai"), and further in view of U.S. Application Publication No. 2003/0086504 to Magee et al. (hereinafter "Magee"). Applicant respectfully traverses for two reasons. First, the combination of Peeters, Kumagai, and Magee fails to teach or suggest all the claim limitations, more specifically they teach away from Applicant's claimed invention. Second, the Patent Office has failed to provide the requisite supported motivation to combine Peeters, Kumagai and Magee.

All Claim Elements Must Be Taught

In order to establish *prima facie* obviousness, the Patent Office must show where each and every element of the claim is taught or suggested in the combination of references. MPEP § 2143.03. Additionally, the references must be considered in their entirety and cannot teach away from the combination. MPEP § 2141.02. Here, the Patent Office has failed to show the step of assigning a value to each of the plurality of carrier-specific weighting factors as claimed. Further, Kumagai, Peeters, and Magee teach away from the claimed invention by requiring that the weighting factor depend on a signal power of the carriers, as opposed to a noise power.

Peeters discloses that each phase-offset correction factor is multiplied by a corresponding weight coefficient ($A_0 \ldots A_{N-1}$) determined on the basis of the signal-to-noise ratio (SNR) values measured for the different pilot carriers. (Peeters at column 7, lines 33-37). However, the claimed invention assigns a value to each of the plurality of carrier-specific weighting factors

that is related to the noise power, for example, inversely proportional to the noise power. (Applicant's Specification at claim 2; ¶ 14 and 48). Thus, unlike Peeters, the value assigned to the carrier-specific weighting factors, as claimed, is not dependent on the signal power of the plurality of carriers. Additionally, unlike Peeters, claim 3 defines another embodiment of the present invention that assigns different weighting factors to the pilot carrier-specific weighting factors relative to the other non-pilot carriers weighting factors, therein using more than just the pilot carriers to calculate carrier-specific weighting factors. (Applicant's Specification at claim 3; ¶ 20 and 53). Using more than just the pilot carrier-specific weighting factors to calculate the phase offset correction factor will provide more data points, therein creating a more accurate overall phase offset correction factor. Therefore, Peeters fails to teach or suggest all the claim limitations, and, more specifically, Peeters teaches away from what is claimed. In Peeters, the weighting factors depend on the signal power of the pilot carriers and, additionally, only the pilot carriers are used to determine the weighting factors. (Column 3, line 28-30; Column 7, lines 33-37).

Additionally, Kumagai also discloses using weighting factors based on the signal level of a sub-carrier. Kumagai repeatedly states that when the signal level is high, the weighting factor is high, and when the signal level is low, the weighting factor is low. (Kumagai at ¶ 32 and 180; Figures 10, 12, 14). As argued above, the carrier-specific weighting factor of the claimed invention is weighted on a value related to the noise power. Specifically, as stated at paragraph 43 of Applicant's Specification as originally filed, the values of the weights for each carrier are selected by giving greater weights to carriers where less noise is present. In this manner, Kumagai fails to teach or suggest a weighting factor dependent on noise power. Further, Kumagai also teaches away from the claimed invention, since the weighting factors of Kumagai are only based on the signal level of a sub-carrier. The difference in using Kumagai's system of weighting factors instead of that of the claimed invention is demonstrated in the following example. Consider a sub-carrier 'A' containing both a high signal and high noise level compared to the other 'N' sub-carriers. Here, Kumagai would give a higher value to the weight factor of sub-carrier 'A' because the signal level is high. However, the claimed invention would give the weight factor of sub-carrier 'A' a lower value since there is more noise present in sub-carrier 'A' as compared to the other 'N' sub-carriers. Thus, the claimed invention guards against making the weighting factor of a sub-carrier that contains a large amount of noise from being large

compared to the other less noisy sub-carrier weighting factors, resulting in a more reliable reproduction of the transmitted signal. (Applicant's specification at ¶ 12). This also reduces the chance of over compensating the phase-offset correction factor applied to a subsequently received signal, which could result in undesired distortion of the received signal. Therefore, Kumagai does not cure the deficiency of Peeters and also teaches away from the claimed invention, since Kumagai uses weighting factors that only depend upon the signal level of a sub-carrier.

Still Further, Magee does not cure this deficiency since it also uses a value for the weighting factor that depends on the signal power.

Since the cited references fail to teach or suggest all the claim limitations, the Patent Office has failed to establish a case of *prima facie* obviousness. Since the Patent Office has failed to establish *prima facie* obviousness, the rejection of claims 2, 3, and 6 is improper and these claims are allowable for at least these reasons.

Motivation to Combine

In order to establish *prima facie* obviousness the Patent Office must also articulate some reason why the combination or modification is desirable. MPEP § 2143.01. Furthermore, this reason must be supported by actual evidence. *In re Dembiczak*, 175 F.3d 994, 999 (Fed. Cir. 1999). Here, the Patent Office has failed to provide proper motivation as to why the combination or modification of Peeters, Kumagai, and Magee is desirable.

Although Peeters and Magee use the SNR of a given signal for weighting purposes, Magee uses this ratio to give a confidence association to a constellation point estimate in order to determine if the constellation point is close to the actual value. Magee then uses the weighted/confidence factor to detect errors in a received data stream and correct them through an error-correcting algorithm, such as the Viterbi and/or Reed Solomon (RS) algorithms, which gives a probabilistic best estimate of the data that was likely to have been transmitted. (Magee at ¶ 37-38; Figure 1). Peeters discloses correcting a received data signal by compensating it with a phase-offset correction factor, which is weighted by the SNR of a received signal. By adjusting a received signal with this weighted phase-offset correction factor, the phase error due to the clock timing error between the receiver and transmitter can be adjusted for synchronization. (Abstract; column 5, lines 66 – column 6, line 12). Thus, there is no suggestion or motivation by

Magee to weight a phase-offset correction factor by the SNR to correct a received signal by compensating for clock timing error, as disclosed by Peeters. Additionally, there is no suggestion or motivation by Peeters to weight a constellation point estimate in order to detect and correct errors in a received data stream via an error-correction algorithm, as disclosed by Magee, thereby demonstrating a lack of motivation to combine these references. Since there is a lack of motivation to combine Peeters and Magee, the Patent Office has failed to establish *prima facie* obviousness for at least this reason.

Further, Kumagai also lacks motivational support for combining with Magee because it also weights a phase-offset correction factor for compensation of a received data signal, and provides no suggestion or motivation to weight constellation point estimates for use in an error-correction algorithm. Still further, as discussed above, Kumagai teaches away from Peeters by using a value for the weighting factor that is only dependent on the signal level, whereas Peeters uses a weighting factor that is dependent on the SNR of the pilot carriers. As discussed above, Kumagai and Peeters may actually weight a signal with the same signal level differently because Peeters uses the SNR, thereby demonstrating a lack of proper support for a motivation to combine these references as well.

Since the Patent Office has failed to provide properly supported evidence for combining Peeters, Kumagai, and Magee, these references cannot form a basis of *prima facie* obviousness, and the rejection of claims 2, 3, and 6 is improper, and these claims are allowable for this reason as well.

Rejection Under 35 U.S.C. § 103(a) –Kumagai, Peeters, and Belotserkovsky

On page 5 of the Office Action mailed November 1, 2005, the Patent Office rejected claims 4, 7, 9-11, 14, 16-17, 19-20, 22, and 24-27 under 35 U.S.C. § 103(a) as being unpatentable over Kumagai in view of Peeters and further in view of U.S. Patent No. 6,704,374 to Belotserkovsky et al. (hereinafter "Belotserkovsky"). Applicant respectfully traverses.

Independent claims 4, 7, 17, and 25 include similar language pertaining to the carrier-specific weighting factors discussed above. Further, Belotserkovsky does not cure the deficiencies of Kumagai and Peeters. Therefore the rejection of claims 4, 7, 17, and 25 is improper, and these claims are allowable for at least this reason.

Claims 9-11, 14, 16, 19-20, 22, 24, and 26-27, which depend directly or indirectly from claims 4, 7, 17, and 25, are allowable for this reason as well.

Rejection Under 35 U.S.C. § 103(a) – Kumagai, Peeters, Belotserkovsky, and Magee

On page 8 of the Office Action mailed November 1, 2005, the Patent Office rejected claims 8 and 18 under 35 U.S.C. § 103(a) as being unpatentable over Kumagai in view of Peeters, further in view of Belotserkovsky, and further in view of Magee. Applicant respectfully traverses.

Claims 8 and 18 depend directly from claims 7 and 17, respectively, which are argued above as allowable. Therefore, claims 8 and 18 are allowable for at least the reasons argued above.

Rejection Under 35 U.S.C. § 103(a) – Peeters, Kumagai, Belotserkovsky, and IIR FAQ

On page 9 of the Office Action mailed November 1, 2005, the Patent Office rejected claim 13 under 35 U.S.C. § 103(a) as being unpatentable over Peeters in view Kumagai, further in view of Belotserkovsky, and further in view Iowegian International publication "dspGuru: Infinite Impulse Response Filter FAQ" (hereinafter "IIR FAQ"). Applicant respectfully traverses.

Claim 13 depends indirectly from claim 7, which is argued above as allowable. Further, IIR FAQ does not cure the deficiencies of Kumagai, Peeters, and Belotserkovsky, since it merely pertains to the description of an IIR filter. Therefore, the rejection of claim 13 is improper, and this claim is allowable for at least the reasons argued above.

Rejection Under 35 U.S.C. § 103(a) – Hampel, Gosh, Kumagai, and Peeters

On page 9 of the Office Action mailed November 1, 2005, the Patent Office rejected claims 28-30 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,442,211 to Hampel et al. (hereinafter "Hampel"), in view of U.S. Application Publication No. 2003/0112902 to Ghosh et al. (hereinafter "Ghosh"), further in view of Kumagai, and further in view of Peeters. Applicant respectfully traverses.

Independent claim 28 also contains language related to the carrier-specific weighting factors discussed above. Further, Hampel and Ghosh do not cure the previously argued deficiencies of Kumagai and Peeters. Thus, the rejection of claim 28 is improper, and the claim

is allowable for at least the reasons argued above. Also, the rejection of claims 29 and 30, which depend directly or indirectly from claim 28, is also improper for this reason, and these claims are allowable as well.

Further, Hampel relates to coding and decoding of a transmitted signal in order to obtain low bit or message error probability. Hampel specifically states that carrier phase and sampling phase correction is avoided by using the described system. (Column 2, lines 10-19; column 12, lines 38-46). Thus, Hampel clearly teaches away from the claimed invention, Peeters and Kumagai, and the Patent Office has failed to provide proper support for a motivation to combine Hampel with Peeters and Kumagai to establish *prima facie* obviousness of the claimed invention. Claims 28-30 are allowable for this reason as well.

Still Further, Gosh relates to diversity combining, and more specifically bit-level diversity combining. (Abstract). Diversity combining involves receiving and processing multiple versions of the same signal and using those multiple versions to obtain a single improved received signal. Each bit is weighted to determine which path transmitted the bit closest to the actual transmitted bit value. Combining the multiple bits together or selecting the bit with the highest probability that it is closest to the actual transmitted value will give a higher probability estimate that the chosen bit is the actual transmitted value, therein reducing bit errors within the received data. Therefore, unlike Peeters and Kumagai, Gosh does not weight a phase-offset correction factor to compensate a received signal, thereby showing a lack of proper support for a motivation to combine these references. Since there is a lack of proper support for a motivation to combine, the Patent Office has failed to establish *prima facie* obviousness, the rejection of claims 28-30 is improper, and these claims are allowable for this reason as well.

Applicant respectfully requests reconsideration of the rejections in light of the amendments and remarks presented herein, and earnestly solicits claim allowance at the Examiner's earliest convenience. Applicant reserves the right to make future arguments about further patentable distinctions between the claimed invention and the above-cited references.

Respectfully submitted,

WITHROW & TERRANOVA, P.L.L.C.

By:

Benjamin S. Withrow
Registration No. 40,876
P.O. Box 1287
Cary, NC 27512
Telephone: (919) 654-4520

Date: February 27, 2006
Attorney Docket: 2867-252

CERTIFICATE OF TRANSMISSION
I HEREBY CERTIFY THAT THIS DOCUMENT IS BEING TRANSMITTED VIA FACSIMILE ON THE DATE INDICATED BELOW TO:

Examiner: Linda Wong Art Unit: 2634 Fax: 571-273-8300

Michelle Heymann
Name of Sender

Signature

2-27-06
Date of Transmission